IBM System x3650 M4

IBM Redbooks Product Guide

The IBM® System x3650 M4 server provides outstanding performance for your business-critical applications. Its energy-efficient design supports more cores, memory, and data capacity in a scalable 2U package that is easy to service and manage. With more computing power per watt and the latest Intel Xeon processors, you can reduce costs while maintaining speed and availability.

Suggested use: database, virtualization, enterprise applications, collaboration/email, streaming media, web, HPC, Microsoft RemoteFX, and cloud applications.

Figure 1 shows the IBM System x3650 M4.

Figure 1. The IBM System x3650 M4

Did you know?

The x3650 M4 offers a flexible, scalable design and simple upgrade path to 16 hard-disk drives (HDDs) or solid-state drives (SSDs) plus optical and tape drives at the same time, with up to six PCIe Gen 3 slots and up to 768 GB of memory. This flexible onboard Ethernet solution provides four standard embedded Gigabit Ethernet ports and two optional embedded 10 Gb Ethernet ports without occupying PCIe slots. Comprehensive systems management tools with the next-generation Integrated Management Module II (IMM2) make it easy to deploy, integrate, service, and manage.

Key features

The x3650 M4 is an outstanding 2U two-socket business-critical server, offering improved performance and pay-as-you grow flexibility along with new features that improve server management capability. This powerful system is designed for your most important business applications and cloud deployments.

Combining balanced performance and flexibility, the x3650 M4 is a great choice for small and medium businesses up to the large enterprise. It can provide outstanding uptime to keep business-critical applications and cloud deployments running safely. Ease of use and comprehensive systems management tools make it easy to deploy. Outstanding RAS and high-efficiency design improve your business environment and help save operational costs.

Scalability and performance

The x3650 M4 offers numerous features to boost performance, improve scalability, and reduce costs:

- Intel Xeon processor E5-2600 product family improves productivity by offering superior system performance with 8-core processors and up to 2.9 GHz core speeds, up to 20 MB of L3 cache, and up to two 8 GT/s QPI interconnect links.
- Up to two processors, 16 cores, and 32 threads maximize the concurrent execution of multi-threaded applications.
- Intelligent and adaptive system performance with Intel Turbo Boost Technology 2.0 allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor TDP.
- Intel Hyper-Threading Technology boosts performance for multi-threaded applications by enabling simultaneous multi-threading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.
- Intel Advanced Vector Extensions (AVT) significantly improve floating-point performance for compute-intensive technical and scientific applications compared to Intel Xeon 5600 series processors.
- Twenty-four Load Reduced DIMMs (LRDIMMs) of 1333 MHz DDR3 ECC memory provide speed, high availability, and a memory capacity of up to 768 GB (running at 1066 MHz).
- Theoretical maximum memory bandwidth of the Intel Xeon processor E5 family is 51.6 GB/s, which is 60% more than in the previous generation of Intel Xeon processors.
- The use of solid-state drives (SSDs) instead of, or along with, traditional spinning drives (HDDs) can significantly improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- Up to 16 drive bays, together with internal backup and an optical drive at the same time, provide a flexible and scalable all-in-one platform to meet your increasing demands.
- The server has four integrated Gigabit Ethernet ports and two optional 10 Gb Ethernet ports with mezzanine cards that do not consume PICe slots.
- The server offers PCI Express 3.0 I/O expansion capabilities that improve the theoretical maximum bandwidth by 60% (8 GT/s per link) compared to the previous generation of PCI Express 2.0.
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family. This integration helps to dramatically reduce I/O latency and increase overall system performance.

Availability and serviceability

The x3650 M4 provides many features to simplify serviceability and increase system uptime:

- The server offers memory mirroring and memory rank sparing for redundancy in the event of a non-correctable memory failure.
- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as CPU, memory, and adapter cards.
- The server offers hot-swap drives, supporting RAID redundancy for data protection and greater system uptime.
- The server has up to two redundant hot-swap power supplies and four hot-swap dual-motor N+N redundant fans to provide availability for business-critical applications.
- The power source independent light path diagnostics panel and individual light path LEDs quickly lead the technician to failed (or failing) components, which simplifies servicing, speeds up problem resolution, and helps improve system availability.
- Predictive Failure Analysis (PFA) detects when system components (processors, VRMs, memory, HDDs, fans, and power supplies) operate outside of standard thresholds and generates proactive alerts in advance of a possible failure, therefore increasing uptime.
- Solid-state drives (SSDs) offer significantly better reliability than traditional mechanical HDDs for greater uptime.
- Built-in Integrated Management Module Version II (IMM2) continuously monitors system parameters, triggers alerts, and performs recovering actions in case of failures to minimize downtime.
- Built-in diagnostics, using Dynamic Systems Analysis (DSA) Preboot, speed up troubleshooting tasks to reduce service time.
- Three-year customer-replaceable unit and on-site limited warranty, 9x5 next business day. Optional service upgrades are available.

Manageability and security

Powerful systems management features simplify local and remote management of the x3650 M4:

- The server includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management.
- Integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Integrated Trusted Platform Module (TPM) 1.2 support enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Industry-standard Advanced Encryption Standard (AES) NI support for faster, stronger encryption.
- IBM Systems Director is included for proactive systems management. It offers comprehensive systems management tools that help to increase uptime, reduce costs, and improve productivity through advanced server management capabilities.
- Intel Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supported operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space, protected from all other software running on a system.

Energy efficiency

The x3650 M4 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Energy-efficient planar components help lower operational costs.
- Highly efficient 550 W, 750 W, and 900 W ac power supplies with 80 PLUS Platinum certification.
- Intel Xeon processor E5-2600 product family offers significantly better performance over the previous generation while fitting into the same thermal design power (TDP) limits.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy the demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.35 V DDR3 memory RDIMMs consume 15% less energy compared to 1.5 V DDR3 RDIMMs.
- Solid state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.
- The server uses hexagonal ventilation holes, which is a part of IBM Calibrated Vectored Cooling™ technology. Hexagonal holes can be grouped more densely than round holes, providing more efficient airflow through the system.
- IBM Systems Director Active Energy Manager™ provides advanced data center power notification and management to help achieve lower heat output and reduced cooling needs.

Locations of key components and connectors

Figure 2 shows the front of the server.

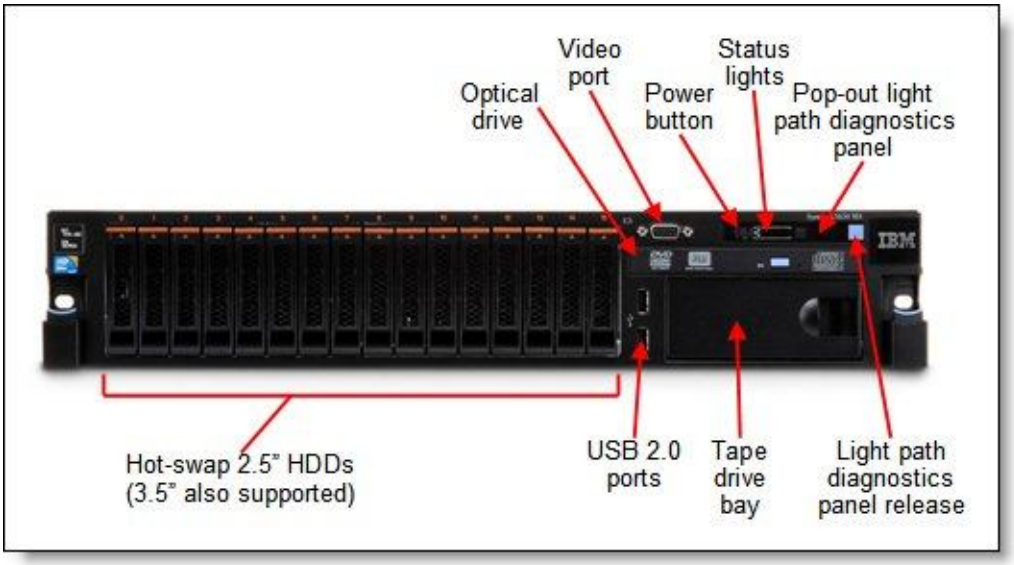

Figure 2. Front view of the IBM System x3650 M4

Figure 3 shows the rear of the server.

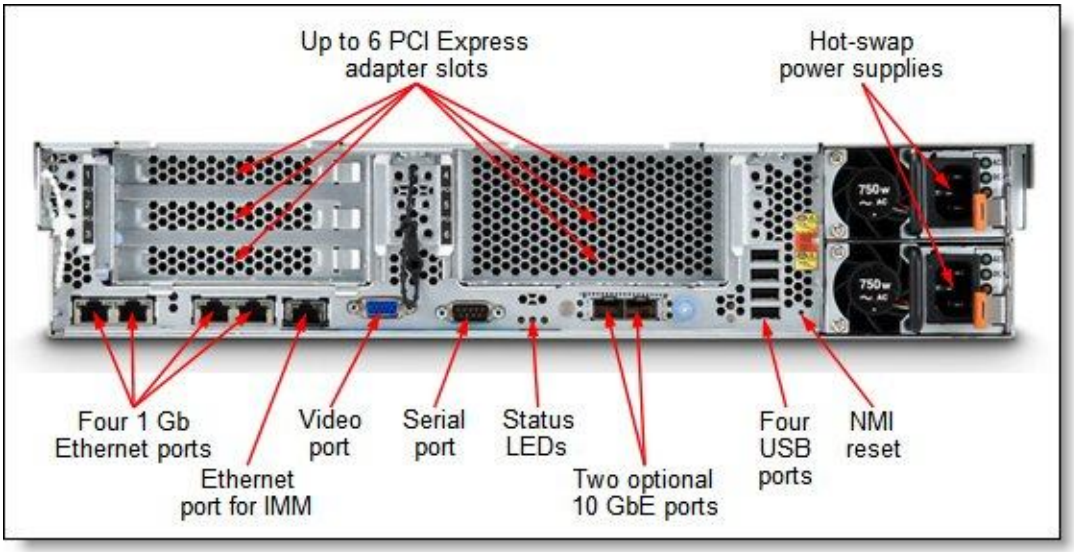

Figure 3. Rear view of the IBM System x3650 M4

Figure 4 shows the locations of key components inside the server.

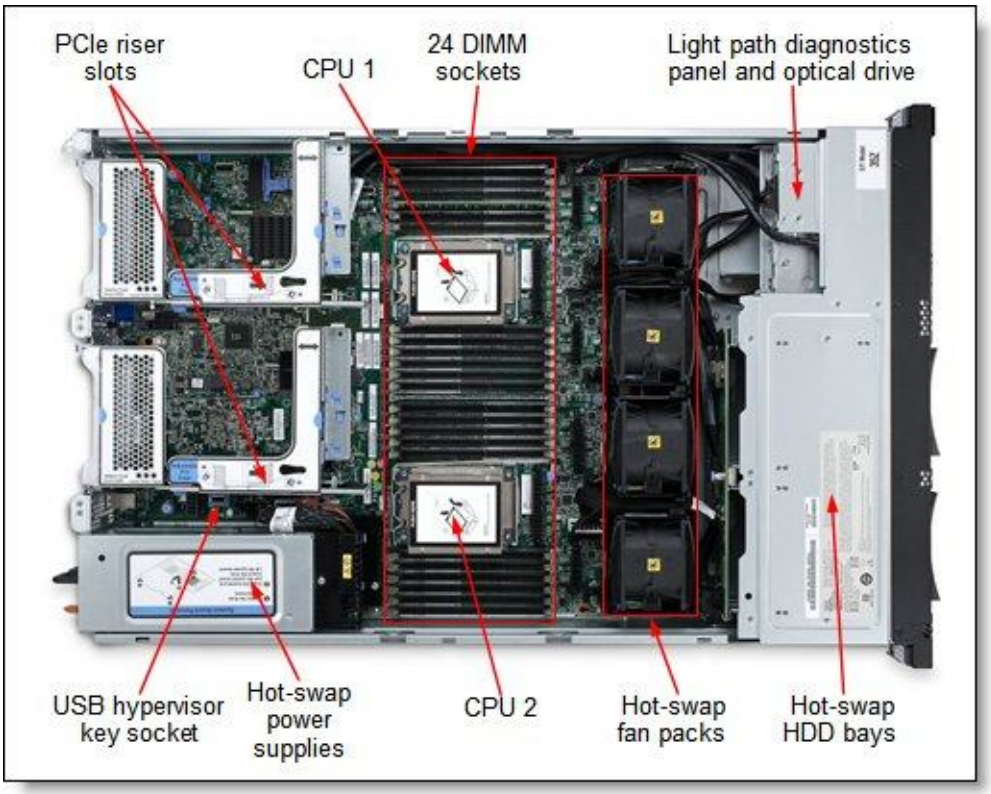

Figure 4. Inside view of the IBM System x3650 M4

Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications (part 1)

Components	Specification
Form factor	2U Rack.
Processor	Up to two Intel Xeon processor E5-2600 product family CPUs with eight cores (up to 2.9 GHz) or six cores (up to 2.9 GHz) or quad-cores (up to 3.3 GHz). Two QPI links up to 8.0 GT/s each. Up to 1600 MHz memory speed. Up to 20 MB L3 cache.
Chipset	Intel C602J.
Memory	Up to 24 DIMM sockets (12 DIMMs per processor). RDIMMs, UDIMMs, HCDIMMs (HyperCloud), and LRDIMMs (Load Reduced DIMMs) supported, but memory types cannot be intermixed. Memory speed up to 1600 MHz.
Memory maximums	With RDIMMs: Up to 384 GB with 24x 16 GB RDIMMs and two processors With UDIMMs: Up to 64 GB with 16x 4 GB UDIMMs and two processors With HCDIMMs: Up to 384 GB with 24x 16 GB HCDIMMs and two processors With LRDIMMs: Up to 768 GB with 24x 32 GB LRDIMMs and two processors
Memory protection	ECC, Chipkill, memory mirroring, and memory rank sparing.
Disk drive bays	Up to 16 2.5" hot-swap SAS/SATA bays, or up to six 3.5" hot-swap SAS/SATA bays, or up to six 3.5" Simple Swap SATA bays.
Maximum internal storage	Up to 14.4 TB with 900 GB 2.5" SAS HDDs, up to 16 TB with 1 TB 2.5" NL SAS/SATA HDDs, or up to 18 TB with 3 TB 3.5" NL SAS/SATA HDDs. Intermix of SAS/SATA is supported.
RAID support	RAID 0, 1, 10 with integrated ServeRAID M5110e; optional upgrades to RAID 5, 50 are available (zero-cache; 512 MB battery-backed cache; 512 MB or 1 GB flash-backed cache). Optional upgrade to RAID 6, 60 is available for 512 MB or 1 GB cache.
Optical drive bays	One bay for optional DVD-ROM or Multiburner drive.
Tape drive bays	Optional Tape Enablement Kit is available to support one DDS5, DDS6, or RDX internal USB tape drive.
Network interfaces	Four integrated Gigabit Ethernet 1000BASE-T ports (RJ-45); two embedded 10 Gb Ethernet ports (10GBASE-T RJ-45 or 10GBASE-SR SFP+ based) on optional 10 Gb Ethernet mezzanine card (does not consume PCIe slot).
PCI Expansion slots	Up to six slots depending on the riser cards installed. The slots are as follows: ● Slot 1: PCIe 3.0 x8; full-height, full-length ● Slot 2: PCIe 3.0 x8; full-height, half-length ● Slot 3: PCIe 3.0 x8; full-height, half-length ● Slot 4: Optional, requires second processor and second riser card ● Slot 5: Optional, requires second processor and second riser card ● Slot 6: Optional, requires second processor and second riser card Optional riser cards available with PCIe x8 or PCIe x16 or PCI-X slots.
Ports	Two USB 2.0 and one DB-15 video on front. Four USB 2.0, one DB-15 video, one DB-9 serial, one RJ-45 systems management, four RJ-45 GbE network ports, two optional RJ-45 or SFP+ 10 GbE network ports on rear. Two internal USB ports (for embedded hypervisor and internal tape drive).

Table 1. Standard specifications (part 2)

Components	Specification
Cooling	IBM Calibrated Vectored Cooling™ with up to four N+N redundant hot swap fans (three standard, additional fan with second processor); each fan has two motors.
Power supply	Up to two redundant hot-swap 550 W ac or 750 W ac or 900 W ac power supplies (80 PLUS Platinum certification).
Video	Matrox G200eR2 with 16 MB memory integrated into the IMM2. Maximum resolution is 1600x1200 at 75 Hz with 16 M colors.
Hot-swap parts	Hard drives, power supplies, and fans.
Systems management	UEFI, IBM Integrated Management Module II (IMM2), Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, IBM Systems Director and Active Energy Manager, IBM ServerGuide. Optional IMM Advanced Upgrade software feature for remote presence.
Security features	Power-on password, administrator's password, Trusted Platform Module (TPM).
Operating systems supported	Microsoft Windows Server 2008 R2 and 2008, Red Hat Enterprise Linux 5 and 6, SUSE Linux Enterprise Server 10 and 11, VMware ESX 4.1 and VMware ESXi 4.1 embedded hypervisor, VMware vSphere 5.
Limited warranty	Three-year customer-replaceable unit and on-site limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades are available through IBM ServicePacs®: Four-hour or two-hour response time, eight-hour fix time, one-year or two-year warranty extension, remote technical support for IBM hardware and some IBM and third-party applications.
Dimensions	Height: 86 mm (3.4 in), width: 445 mm (17.5 in), depth: 746 mm (29.4 in)
Weight	Minimum configuration: 25 kg (55 lb), maximum: 30 kg (65 lb)

The x3650 M4 servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Rack Installation Instructions
- Documentation CD that contains the *Installation and User's Guide*
- IBM Systems Director 6.3 Base for x86 DVD-ROM
- IBM System x® Gen-III Slides Kit
- IBM System x Gen-III Cable Management Arm (CMA)
- 2.8 m (9.18 in) C13-C14 power cord (one for models with one power supply, and two for models with two power supplies)

Standard models

The following table lists the standard models.

Table 2. Standard models

Model	Intel Xeon Processors† (two maximum)	Memory	RAID	Disk bays	Disks	GbE	Optical	Power (W)
Models announced March 2012								
7915-A2x	1x E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M5110e	8 / 16	Open	4	Open	1x 550W
7915-B2x	1x E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110e	8 / 16	Open	4	Open	1x 550W
7915-C2x	1x E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e	8 / 16	Open	4	Open	1x 550W
7915-C4x	1x E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e	6 / 6	Open	4	Open	1x 550W
7915-D2x	1x E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB (f)	8 / 16	Open	4	Open	1x 750W
7915-F2x	1x E5-2640 6C 2.5GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB (f)	8 / 16	Open	4	Open	1x 750W
7915-G2x	1x E5-2650 8C 2.0GHz 20MB 1600MHz 95W	1x 8 GB	M5110e 1GB (f)	8 / 16	Open	4	Open	1x 750W
7915-52x	1x E5-2650L 8C 1.8GHz 20MB 1600MHz 70W	1x 8 GB	M5110e 1GB (f)	8 / 16	Open	4	Open	1x 550W
7915-H2x	1x E5-2660 8C 2.2GHz 20MB 1600MHz 95W	1x 8 GB	M5110e 1GB (f)	8 / 16	Open	4	Open	1x 750W
7915-62x	1x E5-2665 8C 2.4GHz 20MB 1600MHz 115W	1x 8 GB	M5110e 1GB (f)	8 / 16	Open	4	Open	1x 750W
7915-J2x	1x E5-2670 8C 2.6GHz 20MB 1600MHz 115W	1x 8 GB	M5110e 1GB (f)	8 / 16	Open	4	Open	1x 750W
7915-L2x	1x E5-2680 8C 2.7GHz 20MB 1600MHz 130W	1x 8 GB	M5110e 1GB (f)	8 / 16	Open	4	Open	1x 900W

† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, power consumption
(f) The integrated ServeRAID M5110e RAID controller in this model includes flash-backed cache.

Refer to the Specifications section for information about standard features of the server.

Express models

The following table lists the express models.

Table 3. Express models (Part 1)

Model	Processor	Memory	RAID controller	Disk bays	Disks	GbE	Slots	Optical	Power
North America (NA)									
7915-EAU	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-EBU	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1 x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-ECU	1x Xeon E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1 x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 750 W
7915-EDU	1x Xeon E5-2640 6C 2.5GHz 15MB 1333MHz 95W	2 x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	2x 750 W
7915-EEU	1x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	1 x 8 GB	M5110e 1GB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 750 W
Latin America (LA)									
7915-EAU	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-EBU	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1 x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-ECU	1x Xeon E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1 x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 750 W
7915-EDU	1x Xeon E5-2640 6C 2.5GHz 15MB 1333MHz 95W	2 x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	2x 750 W
7915-EEU	1x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	1 x 8 GB	M5110e 1GB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 750 W
Europe Integrated Operating Team (IOT)									
7915-E1G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M5110e	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-E2G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e	8x 2.5" HS / 16	2 x 300GB 2.5" 10k HS SAS	4x GbE	3 / 6	Multi-burner	2x 550 W
7915-E3G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-E4G	1x Xeon E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	2 x 300GB 2.5" 10k HS SAS	4x GbE	3 / 6	Multi-burner	1x 750 W
7915-E5G	2x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	2x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	3 x 300GB 2.5" 10k HS SAS	4x GbE	6 / 6	Multi-burner	2x 750 W

Table 3. Express models (Part 2)

Model	Processor	Memory	RAID controller	Disk bays	Disks	GbE	Slots	Optical	Power
Central and Eastern Europe (CEE) and Middle East & Africa (MEA)									
7915-E1G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M5110e	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-E2G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e	8x 2.5" HS / 16	2 x 300GB 2.5" 10k HS SAS	4x GbE	3 / 6	Multi-burner	2x 550 W
7915-E3G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-E4G	1x Xeon E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	2 x 300GB 2.5" 10k HS SAS	4x GbE	3 / 6	Multi-burner	1x 750 W
7915-E5G	2x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	2x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	3 x 300GB 2.5" 10k HS SAS	4x GbE	6 / 6	Multi-burner	2x 750 W
7915-K1G	1x Xeon E5-2609 4C 2.4GHz 10MB 1066MHz 80W	1x 4 GB	M5110e	6x 3.5" HS/ 6	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-K4G	1x Xeon E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	2x 750 W
7915-K5G	1x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	2x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	2x 750 W
Russia/Commonwealth of Independent States (CIS)									
7915-K2G	1x Xeon E5-2603 4C 1.8GHz 10MB 1066MHz 80W	1x 4 GB	M5110e 512MB Cache + Battery	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-K3G	1x Xeon E5-2620 6C 2.0GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	1x 550 W
7915-K4G	1x Xeon E5-2630 6C 2.3GHz 15MB 1333MHz 95W	1x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	2x 750 W
7915-K5G	1x Xeon E5-2650 8C 2.0GHz 20MB 1600MHz 95W	2x 8 GB	M5110e 512MB Flash	8x 2.5" HS / 16	Optional	4x GbE	3 / 6	Multi-burner	2x 750 W

Processor options

The x3650 M4 supports the processor options listed in the following table. The server supports up to two processors. This table shows which server models have each processor standard. If there is no corresponding *where-used* model for a particular processor, this processor is only available through CTO. Second processor options include an additional cooling fan.

Table 4. Processor options

Part number	Description	Standard models where used
Intel Xeon processor E5-2600 product family		
69Y5323	Intel Xeon Processor E5-2603 4C 1.8GHz 10MB 1066MHz 80W	A2x
69Y5325	Intel Xeon Processor E5-2609 4C 2.4GHz 10MB 1066MHz 80W	B2x
69Y5326	Intel Xeon Processor E5-2620 6C 2.0GHz 15MB 1333MHz 95W	C2x, C4x
69Y5327	Intel Xeon Processor E5-2630 6C 2.3GHz 15MB 1333MHz 95W	D2x
94Y6603	Intel Xeon Processor E5-2630L 6C 2.0GHz 15MB 1333MHz 60W	-
94Y6686	Intel Xeon Processor E5-2637 2C 3.0GHz 5MB 1600MHz 80W	-
69Y5328	Intel Xeon Processor E5-2640 6C 2.5GHz 15MB 1333MHz 95W	F2x
94Y6604	Intel Xeon Processor E5-2643 4C 3.3GHz 10MB 1600MHz 130W	-
69Y5329	Intel Xeon Processor E5-2650 8C 2.0GHz 20MB 1600MHz 95W	G2x
69Y5336	Intel Xeon Processor E5-2650L 8C 1.8GHz 20MB 1600MHz 70W	52x
69Y5330	Intel Xeon Processor E5-2660 8C 2.2GHz 20MB 1600MHz 95W	H2x
94Y6687	Intel Xeon Processor E5-2665 8C 2.4GHz 20MB 1600MHz 115W	62x
69Y5333	Intel Xeon Processor E5-2667 6C 2.9GHz 15MB 1600MHz 130W	-
94Y6602	Intel Xeon Processor E5-2670 8C 2.6GHz 20MB 1600MHz 115W	J2x
69Y5331	Intel Xeon Processor E5-2680 8C 2.7GHz 20MB 1600MHz 130W	L2x
94Y6685	Intel Xeon Processor E5-2690 8C 2.9GHz 20MB 1600MHz 135W	-

Memory options

The IBM System x3650 M4 supports DDR3 memory. The server supports up to 12 DIMMs when one processor is installed and up to 24 DIMMs when two processors are installed. Each processor has four memory channels, and there are three DIMMs per channel. The following rules apply when selecting the memory configuration:

- Server supports UDIMMs, RDIMMs, HCDIMMs, and LRDIMMs.
- Mixing different types of memory (UDIMMs, RDIMMs, HCDIMMs, and LRDIMMs) is not supported.
- Mixing 1.5 V and 1.35 V DIMMs in the same server is supported; in such a case, all DIMMs operate at 1.5 V.
- Maximum number of ranks per one channel is eight (with the exception of Load Reduced DIMMs where more than eight ranks are supported, because one quad-rank LRDIMM provides the same electrical load on a memory bus as a single-rank RDIMM).

- The maximum quantity of DIMMs that can be installed in the server depends on the number of CPUs, DIMM type, rank, and operating voltage, as shown in the "Max. qty supported" row in Table 5.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of:
  - Memory speed that is supported by the specific CPU.
  - Lowest of maximum operating speeds for selected memory configuration that depends on rated speed, operating voltage, and quantity of DIMMs per channel, as shown under "Max. operating speed" section in Table 5.

Table 5. Maximum memory speeds

DIMM type **DIMM specification**	**UDIMM**		**RDIMM**								**HCDIMM**	**LRDIMM**	
Rank	Dual rank		Single rank			Dual rank			Quad rank		Dual rank	Quad rank	
Rated speed	1333 MHz		1333 MHz		1600 MHz	1333 MHz		1600 MHz	1066 MHz		1333 MHz	1333 MHz	
Rated voltage	1.35 V		1.35 V		1.5 V	1.35 V		1.5 V	1.35 V		1.5 V	1.35 V	
Operating voltage	1.35 V	1.5 V	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V
Max. qty supported*	16	16	16	24	24	16	24	24	16	16	24	24	24
Max. DIMM capacity	4 GB	4 GB	4 GB	4 GB	4 GB	16 GB	16 GB	8 GB	8 GB	8 GB	16 GB	32 GB	32 GB
Max. memory capacity	64 GB	64 GB	64 GB	96 GB	96 GB	256 GB	384 GB	192 GB	128 GB	128 GB	384 GB	768 GB	768 GB
Max. memory at max. speed	32 GB	64 GB	64 GB	64 GB	64 GB	256 GB	256 GB	128 GB	128 GB	64 GB	384 GB	256 GB	512 GB
Max. operating speed													
1 DIMM per channel	1333 MHz	1333 MHz	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz	1600 MHz	800 MHz	1066 MHz	1333 MHz	1333 MHz	1333 MHz
2 DIMMs per channel	1066 MHz	1333 MHz	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz	1600 MHz	800 MHz	800 MHz	1333 MHz	1066 MHz	1333 MHz
3 DIMMs per channel	NS**	NS**	NS**	1066 MHz	1066 MHz	NS**	1066 MHz	1066 MHz	NS**	NS**	1333 MHz	1066 MHz	1066 MHz

* Maximum quantity supported is shown for two processors installed. When one processor is installed, the maximum quantity supported is a half of the quantity that is shown. Shaded cells indicate when all DIMM sockets can be occupied.
** NS = Not Supported

The following memory protection technologies are supported:

- ECC
- Chipkill (for x4-based memory DIMMs)
- Memory mirroring
- Memory rank sparing

If memory mirroring is used, DIMMs must be installed in pairs (minimum of one pair per each CPU), and both DIMMs in a pair must be identical in type and size.

If memory rank sparing is used, then a minimum of one quad-rank DIMM or two single-rank or dual-rank DIMMs must be installed per populated channel (the DIMMs do not need being identical). In rank sparing

mode, one rank of a DIMM in each populated channel is reserved as spare memory. The size of a rank varies depending on the DIMMs installed.

The following table lists the memory options that are available for x3650 M4 server.

Table 6. Memory options

Part number	Description	Maximum quantity supported	Standard models where used
UDIMMs			
49Y1404	4 GB (1x 4 GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC 1333 MHz LP UDIMM	16 (8 per CPU)	-
RDIMMs			
49Y1405	2 GB (1x 2 GB, 1Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	-
49Y1406	4 GB (1x 4 GB, 1Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	A2x, B2x
49Y1559	4 GB (1x 4 GB, 1Rx4, 1.5 V) PC3-12800 CL11 ECC DDR3 1600 MHz LP RDIMM	24 (12 per CPU)	-
49Y1407	4 GB (1x 4 GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	-
49Y1397	8 GB (1x 8 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC 1333 MHz LP RDIMM	24 (12 per CPU)	C2x, C4x, D2x, F2x
90Y3109	8 GB (1x 8 GB, 2Rx4,1.5 V) PC3-12800 DDR3-1600 LP RDIMM	24 (12 per CPU)	52x, 62x, G2x, H2x, J2x, L2x
49Y1399	8 GB (1x 8 GB, 4Rx8, 1.35 V) PC3L-8500 CL7 ECC DDR3 1066 MHz LP RDIMM	16 (8 per CPU)	-
49Y1563	16 GB (1x 16 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	24 (12 per CPU)	-
LRDIMMs			
90Y3105	32 GB (1x32 GB, 4Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP LRDIMM	24 (12 per CPU)	-
HCDIMMs			
00D4964	16 GB (1x 16 GB, 2Rx4, 1.5 V) PC3-10600 1333 MHz LP HCDIMM	24 (12 per CPU)	-

Internal disk storage options

IBM System x3650 M4 server supports the following internal storage configurations:

- Sixteen 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
- Eight 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
- Six 3.5" hot-swap SAS/SATA hard drive bays
- Six 3.5" Simple Swap SATA hard drive bays (only available in CTO)

The following figure shows the first three of these configurations.

Figure 5. Internal drive configurations

Backplanes and enablement kits

Standard models (all models except C4x) ship with eight 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays. Model C4x ships with six 3.5" SAS/SATA hot-swap hard drive bays. The following table shows the internal storage expansion options that are available for x3650 M4 server.

Table 7. Internal storage expansion options

Part number	Name	Maximum quantity supported
69Y5319	x3650 M4 Plus 8x 2.5" HS HDD Assembly Kit with Expander	1
69Y5320	x3650 M4 Tape Enablement Kit	1

These options have the following descriptions:

- 69Y5319 upgrades models with eight hot-swap HDD bays to 16 hot-swap HDD bays. This option includes a SAS expander card that is mounted on an HDD backplane, and it does not consume a PCIe slot.
- 69Y5320 upgrades any six, eight, or 16 bay model with an internal tape drive (DDS5, DDS6, or RDX). This option includes two USB cables (one for DDS tape and one for RDX tape). The tape drive is ordered separately.

RAID controllers

The following table lists the RAID controllers and additional options used for internal disk storage of x3650 M4 server.

Table 8. RAID controllers for internal storage

Part number	Description	Max quantity supported	Standard models where used
Integrated	ServeRAID M5110e SAS/SATA Controller	1	A2x, B2x, C2x, C4x, D2x, F2x, G2x, 52x, H2x, 62x, J2x, L2x
81Y4544	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade for IBM System x	1	-
81Y4484	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade for IBM System x	1	-
81Y4487	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade for IBM System x	1	D2x, F2x, 52x, 62x
81Y4559	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade for IBM System x	1	G2x, H2x, J2x, L2x
81Y4508	ServeRAID M5100 Series Battery Kit for IBM System x	1*	-
81Y4546	ServeRAID M5100 Series RAID 6 Upgrade for IBM System x	1†	-

* The ServeRAID M5100 Series Battery Kit (81Y4508) is only supported with ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade (81Y4484).
† The ServeRAID M5100 Series RAID 6 Upgrade (81Y4546) requires RAID 5 upgrades with cache (81Y4484, 81Y4487, or 81Y4559 only).

The integrated ServeRAID M5110e SAS/SATA Controller has the following specifications:

- Two Mini-SAS internal connectors
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M5100 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5100 Series RAID 6 Upgrade
- Supports 512 MB battery-backed cache or 512 MB or 1 GB flash-backed cache
- 6 Gbps throughput per port
- PCIe x8 Gen 3 host interface
- Based on the LSI SAS2208 6 Gbps ROC controller

The following table lists hard drive options for the internal disk storage of the x3650 M4 server.

Table 9. Disk drive options for internal disk storage

Part number	Description	Maximum quantity supported
2.5" NL SATA Hot-Swap HDDs		
81Y9722	IBM 250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	16
81Y9726	IBM 500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	16
81Y9730	IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	16
2.5" NL SAS Hot-Swap HDDs		
90Y8953	IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	16
81Y9690	IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	16
2.5" SAS Hot-Swap HDDs		
90Y8926	IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	16
90Y8877	IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	16
81Y9670	IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD	16
90Y8872	IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	16
81Y9650	IBM 900GB 10K 6Gbps SAS 2.5" SFF HS HDD	16
3.5" NL SAS Hot-Swap HDDs		
90Y8567	IBM 1TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	6
90Y8572	IBM 2TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	6
90Y8577	IBM 3TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	6
3.5" NL SATA Hot-swap HDDs		
81Y9786	IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	6
81Y9790	IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	6
81Y9794	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	6
81Y9798	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	6
3.5" NL SATA Simple-Swap HDDs*		
81Y9802	IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	6
81Y9806	IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	6
81Y9810	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	6
81Y9814	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	6

* These drives are for use in a configuration that is only available via special bid or the Configure To Order (CTO) process.

Internal backup units

The server supports the internal tape drive options listed in the following table. The x3650 M4 Tape Enablement Kit (69Y5320) is required to support these tapes internally.

Table 10. Internal tape drives

Part number	Description	Maximum quantity supported
46C5364	IBM RDX Removable Hard Disk System - Internal USB 160 GB Bundle	1
46C5387	IBM RDX Removable Hard Disk System - Internal USB 320 GB Bundle	1
46C5388	IBM RDX Removable Hard Disk System - Internal USB 500 GB Bundle	1
46C5399	IBM DDS Generation 5 USB Tape Drive	1
39M5636	IBM DDS Generation 6 USB Tape Drive	1

For more information, see the following at-a-glance guides:

- *IBM RDX Removable Disk Backup Solution at-a-glance guide*
  http://www.redbooks.ibm.com/abstracts/tips0726.html?Open
- *IBM DDS Generation 5 USB Tape Drive at-a-glance guide*
  http://www.redbooks.ibm.com/abstracts/tips0755.html?Open
- *IBM DDS Generation 6 USB Tape Drive at-a-glance guide*
  http://www.redbooks.ibm.com/abstracts/tips0725.html?Open

Optical drives

The server supports the optical drive options listed in the following table.

Table 11. Optical drives

Part number	Description	Maximum quantity supported	Standard models where used
46M0901	IBM UltraSlim Enhanced SATA DVD-ROM	1	-
46M0902	UltraSlim Enhanced SATA Multi-Burner	1	-

IBM UltraSlim Enhanced SATA DVD-ROM (part number 46M0901) supports the following media and speeds for reading:

- CD-ROM 24X
- CD-DA (DAE) 20X
- CD-R 24X
- CD-RW 24X
- DVD-ROM (single layer) 8X
- DVD-ROM (dual layer) 8X
- DVD-R (4.7 GB) 6X
- DVD-R DL 4X
- DVD+R 6X
- DVD+R DL 4X
- DVD-RW (4.7 GB) 4X
- DVD+RW 4X
- DVD-RAM (4.7/9.4 GB) 4X

IBM UltraSlim Enhanced SATA Multi-Burner (46M0902) supports the same media and speeds for reading as DVD-ROM (46M0901). This drive also supports the following media and speeds for writing:

- CD-R 24X
- CD-RW 4X
- High Speed CD-RW 10X
- Ultra Speed CD-RW 16X
- Ultra Speed Plus CD-RW 16X
- DVD-R 8X
- DVD-R DL 6X
- DVD+R 8X
- DVD+R DL 6X
- DVD-RW 6X
- DVD+RW 8X
- DVD-RAM 5X

I/O expansion options

The server supports up to six PCIe slots with different riser cards installed into two riser sockets on the system planar (one riser socket supports installation of one riser card). Riser 1 supplies slots 1, 2, and 3. Riser 2 supplies slots 4, 5, and 6. Standard models have Riser card 1 installed with three PCIe 3.0 x8 slots. To enable slots 4 - 6, install a second processor and a second riser card.

The following table lists the PCI riser card options available.

Table 12. PCI riser card options

Part number	Description	Maximum quantity supported
69Y5321	x3650 M4 PCIe Riser Card (3 x8 PCIe slots) (one included in standard models in Riser socket 1)	2
69Y5322	x3650 M4 PCIe Riser Card (1 x16 + 1 x8 PCIe slots)	2
81Y6843	x3650 M4 PCIX Riser Card (2 PCIX + 1 x16 PCIe slots)	2

The slot form factors are as follows:

- Slot 1: PCIe x8, PCIe x16, or PCI-X; full-height, full-length
- Slot 2: PCIe x8 or PCI-X; full-height, half-length
- Slot 3: PCIe x8 or PCIe x16; full-height, half-length (not present if Riser 1 contains 69Y5322 riser card)
- Slot 4: PCIe x8, PCIe x16, or PCI-X; full-height, full-length
- Slot 5: PCIe x8 or PCI-X; full-height, full-length
- Slot 6: PCIe x8 or PCIe x16; full-height, half-length (not present if Riser 2 contains 69Y5322 riser card)

The specific slots that are available depend on the riser cards installed in Riser socket 1 and Riser socket 2, as shown in the following table. Standard models have 69Y5321 installed in Riser socket 1.

Tip: All slots support full-height adapters. Slots 1, 4, and 5 support full-length adapters, whereas slots 2, 3, and 6 (when present) support half-length adapters.

Table 13. PCIe slot descriptions (FH=full height, FL=full length, HL=half length)

Slot number	Riser with three PCIe x8 3.0 slots, 69Y5321 (standard in riser socket 1 in standard models)	Riser with one PCIe x16 3.0 slots and one PCIe x8 3.0 slot, 69Y5322	Riser with two PCI-X 64 bit/133 MHz slots and one PCIe x16 3.0 slot, 81Y6843
Riser socket 1 (Processor 1)	Slot 1: PCIe 3.0 x8; FH, FL	Slot 1: PCIe 3.0 x16 FH, FL	Slot 1: PCI-X 64 bit/133 MHz FH, FL
	Slot 2: PCIe 3.0 x8; FH, HL	Slot 2: PCIe 3.0 x8 FH, HL	Slot 2: PCI-X 64 bit/133 MHz FH, HL
	Slot 3: PCIe 3.0 x8; FH, HL	Slot 3: No slot present	Slot 3: PCIe 3.0 x16 FH, HL
Riser socket 2 (Processor 2 required)	Slot 4 :PCIe 3.0 x8 FH, FL	Slot 4: PCIe 3.0 x16 FH, FL	Slot 4: PCI-X 64 bit/133 MHz FH, FL
	Slot 5: PCIe 3.0 x8 FH, FL	Slot 5: PCIe 3.0 x8 FH, FL	Slot 5: PCI-X 64 bit/133 MHz FH, FL
	Slot 6: PCIe 3.0 x8 FH, HL	Slot 6: No slot present	Slot 6: PCIe 3.0 x16 FH, HL

Note: Slots 4, 5, and 6 require a second processor to be installed.

Network adapters

x3650 M4 supports four integrated Gigabit Ethernet ports. Optionally, two 10 Gb Ethernet ports can be added by installing one of the available dual-port 10 Gb Ethernet mezzanine cards listed in Table 12. These cards use a dedicated connector on the motherboard and do not consume a PCI expansion slot.

Integrated NICs have the following features:

- Intel I350AM4 chip
- Four GbE ports
- TCP Offload Engine (TOE) support
- Wake on LAN support
- 802.1Q VLAN tagging support
- NIC Teaming (load balancing and failover)

The following table lists additional supported network adapters.

Table 14. Network adapters

Part number	Description	Maximum quantity supported#
10 Gb Ethernet (Mezzanine Card - does not consume a PCI expansion slot)		
90Y6456	Emulex Dual Port 10GbE SFP+ Embedded VFA III for IBM System x	1*
10 Gb Ethernet		
49Y7910	Broadcom NetXtreme II Dual Port 10GBase-T Adapter for IBM System x	4
95Y3762	Emulex 10 GbE Virtual Fabric Adapter III for IBM System x	4*
95Y3760	Emulex VFA III FCoE/iSCSI License for IBM System x	4**
49Y7960	Intel X520-DA2 Dual Port 10GbE SFP+ Adapter for IBM System x	4
81Y9990	Mellanox ConnectX-2 Dual Port 10GbE Adapter for IBM System x	4
Converged Network Adapters (CNA)		
42C1800	QLogic 10 Gb Dual Port CNA for IBM System x	4*
42C1820	Brocade 10 Gb Dual-port CNA for IBM System x	4*
Gigabit Ethernet		
39Y6066	NetXtreme II 1000 Express Ethernet Adapter	4
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	4
49Y4220	NetXtreme II 1000 Express Quad Port Ethernet Adapter	4
42C1750	PRO/1000 PF Server Adapter by Intel	4
49Y4230	Intel Ethernet Dual Port Server Adapter I340-T2 for IBM System x	4
49Y4240	Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	4
90Y9352	Broadcom NetXtreme I Quad Port GbE Adapter for IBM System x	4
90Y9370	Broadcom NetXtreme I Dual Port GbE Adapter for IBM System x	4

Maximum quantity is achieved with two processors installed. With one processor, the maximum quantity is half of the listed value (this does not apply to mezzanine cards).
* Converged Network Adapters require SFP+ optical transceivers or direct-attached cables (DAC) cables that must be purchased separately.
** One license per one Emulex 10 GbE Virtual Fabric Adapter III (95Y3762)

Storage host bus adapters

The following table lists storage HBAs supported by x3650 M4 server. The maximum quantity listed is for configurations with two processors installed. If one processor is installed, the maximum quantity supported is half of the listed value.

Table 15. Storage adapters

Part number	Description	Maximum quantity supported
Fibre Channel		
39R6525	QLogic 4 Gb FC Single-Port PCIe HBA for IBM System x	4
39R6527	QLogic 4 Gb FC Dual-Port PCIe HBA for IBM System x	4
42C2069	Emulex 4 Gbps FC Single-Port PCI-e HBA for IBM System x	4
42C2071	Emulex 4 Gbps FC Dual-Port PCI-e HBA for IBM System x	4
59Y1987	Brocade 4 Gb FC Single-port HBA for IBM System x	4
59Y1993	Brocade 4 Gb FC Dual-port HBA for IBM System x	4
42D0485	Emulex 8 Gb FC Single-port HBA for IBM System x	4
42D0494	Emulex 8 Gb FC Dual-port HBA for IBM System x	4
42D0501	QLogic 8 Gb FC Single-port HBA for IBM System x	4
42D0510	QLogic 8 Gb FC Dual-port HBA for IBM System x	4
46M6049	Brocade 8 Gb FC Single-port HBA for IBM System x	4
46M6050	Brocade 8 Gb FC Dual-port HBA for IBM System x	4
SAS		
46M0907	IBM 6 Gb SAS HBA Controller	4

PCIe SSD adapters

Currently, the server does not support High IOPS SSD adapters.

Power supplies

The server supports up to two redundant power supplies. Standard models come with one or two power supplies (model dependent). The following table lists the power supplies.

Table 16. Power supplies

Part number	Description	Max quantity supported	Standard models where used
94Y6668	IBM System x 550W High Efficiency Platinum AC Power Supply	2	A2x, B2x, C2x, C4x, 52x
94Y6669	IBM System x 750W High Efficiency Platinum AC Power Supply	2	D2x, F2x, G2x, H2x, J2x, 62x
94Y6667	IBM System x 900W High Efficiency Platinum AC Power Supply	2	L2x

An AC power supply ships standard with one 2.8 m C13 - C14 power cord.

Integrated virtualization

The server supports VMware ESXi installed on a USB memory key. The key is installed in a USB socket inside the server. The following table lists the virtualization options.

Table 17. Virtualization options

Part number	Description	Maximum quantity supported
41Y8298	IBM Blank USB Memory Key for VMware ESXi Downloads	1
41Y8300	IBM USB Memory Key for VMware vSphere 5.0	1

Remote management

The server contains IBM Integrated Management Module II (IMM2), which provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM2 lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM2 also provides a virtual presence capability for remote server management capabilities.

The IMM provides remote server management through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- Web browser

The optional IBM Integrated Management Module Advanced Upgrade is required to enable the remote presence and blue-screen capture features. The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel colors, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition. The following table lists the remote management option.

Table 18. Remote management option

Part number	Description	Maximum quantity supported
90Y3901	IBM Integrated Management Module Advanced Upgrade	1

Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Small Business Server 2008 Premium Edition
- Microsoft Windows Small Business Server 2008 Standard Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE Linux Enterprise Server 10 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- VMware vSphere 5

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:
http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml

Physical and electrical specifications

Dimensions and weight:

- Height: 86.5 mm (3.4 in)
- Width: 445 mm (17.5 in)
- Depth: 746 mm (29.4 in)
- Weight:
  - Minimum configuration: 25 kg (55 lb)
  - Maximum configuration: 30 kg (65 lb)

Supported environment:

- Air temperature:
  - Server on: 5 C to 40 C (41.0 F to 104 F); altitude: 0 to 915 m (3,000 ft) for 60W to 95W processor models.
  - Server on: 10 C to 35 C (50.0 F to 95 F); altitude: 0 to 915 m (3,000 ft) for 115W to 135W processor models.
  - Server off: 5 C to 45 C (41.0 F to 113 F)
  - Shipment: -40 C to +60 C (-40 F to 140 F)
- Humidity:
  - For 115W to 130W processors/135W processor models:
    - Server on: 20% to 80%, maximum dew point 21 C, maximum rate of change 5 C/hr
    - Server off: 8% to 80%, maximum dew point 27 C
  - For 60W to 95W processor models:
    - Server on: 8% to 85%, maximum dew point 24 C, maximum rate of change 5 C/hr
    - Server off: 8% to 80%, maximum dew point 27 C
- Electrical:
  - Models with 900 W power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 10 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.14 kVA
      - Maximum configuration: 1.02 kVA
  - Models with 750 W power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 8.9 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 4.5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.14 kVA
      - Maximum configuration: 0.9 kVA
  - Models with 550 W power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 6.5 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 3.3 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.13 kVA
      - Maximum configuration: 0.66 kVA

- BTU output:
  - Minimum configuration: 420 Btu/hr (123 watts)
  - Maximum configuration: 3480 Btu/hr (1020 watts)
- Noise level:
  - 6.6 bels (operating)
  - 6.4 bels (idle)

Warranty options

The IBM System x3650 M4 has a three-year on-site warranty with 9x5/next business day terms. IBM offers the warranty service upgrades through IBM ServicePacs, discussed in this section. The IBM ServicePac is a series of prepackaged warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

IBM ServicePac offerings are country-specific, that is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePacs might be available in a particular country. For more information about the IBM ServicePac offerings that are available in your country, visit the IBM ServicePac Product Selector:

https://www-304.ibm.com/sales/gss/download/spst/servicepac

The following table explains warranty service definitions in more detail.

Table 19. Warranty service definitions

Term	Description
IBM on-site repair (IOR)	A service technician will come to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer’s location within two hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer’s location within four hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer’s location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays. If after 1:00 p.m., it is determined that on-site service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician will arrive by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer’s location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays.

In general, the types of IBM ServicePacs are as follows:

- Warranty and maintenance service upgrades:
  - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
  - On-site repair from next business day to 4 or 2 hours
  - One or two years of warranty extension
- Remote technical support services:
  - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all severities
  - Installation and start-up support for System x servers
  - Remote technical support for System x servers
  - Software support - Support Line:
    - Microsoft or Linux software
    - VMware
    - IBM Director

Regulatory compliance

The server conforms to the following standards:

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22, Class A
- IEC 60950-1(CB Certificate and CB Test Report)
- China CCC (GB4943), GB9254 Class A, GB17625.1
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- Korea KN22, Class A; KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22, GOST R 51318.24, GOST R 51317.3.2, GOST R 51317.3.3
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950-1 /IEC60950-1,EK1-ITB2000)

External disk storage expansion

Currently, IBM x3650 M4 does not support external storage expansion. It can be attached to the supported external storage system that is shown in Table 20 using the supported HBAs that are listed in Table 15.

External disk storage systems

The following tabel lists the external storage systems that are supported by x3650 M4 and can be ordered through the System x sales channel. The server might support other IBM disk systems that are not listed in this table. Refer to IBM System Storage® Interoperability Center for further information.

Table 20. External disk storage systems

Part number	Description
1746A2D	IBM System Storage DS3512 Express Dual Controller Storage System
1746A2S	IBM System Storage DS3512 Express Single Controller Storage System
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98
181492H	IBM System Storage EXP395 Expansion Unit
1746A2E	IBM System Storage EXP3512 Express Storage™ Expansion Unit
1746A4E	IBM System Storage EXP3524 Express Storage Expansion Unit

External backup units

The server supports the external backup attachment options that are listed in Table 19.

Table 21. External backup options (Part 1)

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
8767HHX	Half High Tape Drive Enclosure
87651NX	1U Tape Drive Enclosure (with Nema 5-15P LineCord)
8767HNX	Half High Tape Drive Enclosure (with Nema 5-15P LineCord)
Tape enclosure adapters (with cables)	
44E8869	USB Enclosure Adapter Kit
40K2599	SAS Enclosure Adapter Kit
Internal backup drives supported by external tape enclosures	
46C5364	IBM RDX Removable Hard Disk Storage System - Internal USB 160 GB Bundle
46C5387	IBM RDX Removable Hard Disk Storage System - Internal USB 320 GB Bundle
46C5388	IBM RDX Removable Hard Disk Storage System - Internal USB 500 GB Bundle
46C5399	IBM DDS Generation 5 USB Tape Drive
39M5636	IBM DDS Generation 6 USB Tape Drive
43W8478	IBM Half High LTO Gen 3 SAS Tape Drive
44E8895	IBM Half High LTO Gen 4 SAS Tape Drive
49Y9898	IBM Half High LTO Gen 5 Internal SAS Tape Drive

Table 21. External backup options (Part 2)

Part number	Description
External backup units*	
362516X	IBM RDX Removable Hard Disk Storage System - External USB 160 GB Bundle
362532X	IBM RDX Removable Hard Disk Storage System - External USB 320 GB Bundle
362550X	IBM RDX Removable Hard Disk Storage System - External USB 500 GB Bundle
3628L3X	IBM Half High LTO Gen 3 External SAS Tape Drive (with US line cord)
3628L4X	IBM Half High LTO Gen 4 External SAS Tape Drive (with US line cord)
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US line cord)
3628N3X	IBM Half High LTO Gen 3 External SAS Tape Drive (without line cord)
3628N4X	IBM Half High LTO Gen 4 External SAS Tape Drive (without line cord)
3628N5X	IBM Half High LTO Gen 5 External SAS Tape Drive (without line cord)
3580S3V	System Storage TS2230 Tape Drive Express Model H3V
3580S4V	System Storage TS2240 Tape Drive Express Model H4V
3580S5E	System Storage TS2250 Tape Drive Express Model H5S
3580S5X	System Storage TS2350 Tape Drive Express Model S53
3572S4R	TS2900 Tape Library with LTO4 HH SAS drive & rack mount kit
3572S5R	TS2900 Tape Library with LTO5 HH SAS drive & rack mount kit
35732UL	TS3100 Tape Library Model L2U Driveless
35734UL	TS3200 Tape Library Model L4U Driveless
46X2682†	LTO Ultrium 5 Fibre Channel Drive
46X2683†	LTO Ultrium 5 SAS Drive Sled
46X2684†	LTO Ultrium 5 Half High Fibre Drive Sled
46X2685†	LTO Ultrium 5 Half High SAS Drive Sled
46X6912†	LTO Ultrium 4 Half High Fibre Channel Drive Sled
46X7117†	LTO Ultrium 4 Half High SAS DriveV2 Sled
46X7122†	LTO Ultrium 3 Half High SAS DriveV2 Sled

* Note: The external tape drives listed can be ordered through System x sales channel. The server might support other IBM tape drives that are not listed in this table. Refer to IBM System Storage Interoperability Center for further information.
† Note: These part numbers are the tape drives options for 35732UL and 35734UL.

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:
http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml

Top-of-rack Ethernet switches

The server supports the top-of-rack Ethernet switches from IBM System Networking listed in the following table.

Table 22. IBM System Networking - Top-of-rack switches

Part number	Description
IBM System Networking - 1 Gb top-of-rack switches	
0446013	IBM System Networking RackSwitch G8000R
7309CFC	IBM System Networking RackSwitch G8000F
7309CD8	IBM System Networking RackSwitch G8000DC
7309G52	IBM System Networking RackSwitch G8052R
730952F	IBM System Networking RackSwitch G8052F
427348E	IBM Ethernet Switch J48E
6630010	Juniper Networks EX2200 24 Port
6630011	Juniper Networks EX2200 24 Port with PoE
6630012	Juniper Networks EX2200 48 Port
6630013	Juniper Networks EX2200 48 Port with PoE
IBM System Networking - 10 Gb top-of-rack switches	
0446017	IBM System Networking RackSwitch G8124R
7309BF9	IBM System Networking RackSwitch G8124F
7309BD5	IBM System Networking RackSwitch G8124DC
7309BR6	IBM System Networking RackSwitch G8124ER
7309BF7	IBM System Networking RackSwitch G8124EF
7309G64	IBM System Networking RackSwitch G8264R
730964F	IBM System Networking RackSwitch G8264F
7309CR9	IBM System Networking RackSwitch G8264TR
7309CF9	IBM System Networking RackSwitch G8264TF
0719410	Juniper Networks EX4500 - Front to Back Airflow
0719420	Juniper Networks EX4500 - Back to Front Airflow
IBM System Networking - 40 Gb top-of-rack switches	
8036ARX	IBM System Networking RackSwitch G8316R
8036AFX	IBM System Networking RackSwitch G8316F

Uninterruptible power supply units

The server supports attachments to the uninterruptible power supply (UPS) units listed in the following table.

Table 23. Uninterruptible power supply units

Part number	Description
Rack-mounted UPS	
21304RX	IBM UPS 10000XHV
53951AX	IBM 1500VA LCD 2U Rack UPS (100V/120V)
53951KX	IBM 1500VA LCD 2U Rack UPS (230V)
53952AX	IBM 2200VA LCD 2U Rack UPS (100V/120V)
53952KX	IBM 2200VA LCD 2U Rack UPS (230V)
53953AX	IBM 3000VA LCD 3U Rack UPS (100 V/120 V)
53953JX	IBM 3000VA LCD 3U Rack UPS (200 V/208 V)
53956AX	IBM 6000VA LCD 4U Rack UPS (200 V/208 V)
53956KX	IBM 6000VA LCD 4U Rack UPS (230 V)
53959KX	IBM 11000VA LCD 5U Rack UPS (200V/208V/230V)

For more information, see the following at-a-glance guides:

- *IBM 3000VA LCD 3U Rack Uninterruptible Power Supply for IBM System x* at-a-glance guide
  http://www.redbooks.ibm.com/abstracts/tips0782.html?Open
- *IBM 6000VA LCD 4U Rack UPS* at-a-glance guide
  http://www.redbooks.ibm.com/abstracts/tips0793.html?Open

Power distribution units

The server supports attachments to the power distribution units (PDUs) listed in the following table.

Table 24. Power distribution units (part 1)

Part number	Description
Switched and Monitored PDUs	
46M4002	IBM 1U 9 C19/3 C13 Active Energy Manager DPI PDU
46M4003	IBM 1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4004	IBM 1U 12 C13 Active Energy Manager DPI PDU
46M4005	IBM 1U 12 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	IBM 1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
46M4116	IBM 0U 24 C13 Switched and Monitored 30A PDU
46M4119	IBM 0U 24 C13 Switched and Monitored 32A PDU
46M4134	IBM 0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU
46M4137	IBM 0U 12 C19/12 C13 Switched and Monitored 32A 3 Phase PDU
Enterprise PDUs	
71762MX	IBM Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	IBM Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	IBM Ultra Density Enterprise PDU C19 3 Phase 60A PDU+ (NA)
71763NU	IBM Ultra Density Enterprise PDU C19 3 Phase 60A PDU (NA)
39M2816	IBM DPI C13 Enterprise PDU without line cord
39Y8923	DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed line cord
39Y8941	DPI Single Phase C13 Enterprise PDU without line cord
39Y8948	DPI Single Phase C19 Enterprise PDU without line cord
Front-end PDUs	
39Y8934	DPI 32 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8935	DPI 63 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8938	30 amp/125 V Front-end PDU with NEMA L5-30P connector
39Y8939	30 amp/250 V Front-end PDU with NEMA L6-30P connector
39Y8940	60 amp/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector

Table 24. Power distribution units (part 2)

Part number	Description
Universal PDUs	
39Y8951	DPI Universal Rack PDU with US LV and HV line cords
39Y8952	DPI Universal Rack PDU with CEE7-VII Europe LC
39Y8953	DPI Universal Rack PDU with Denmark LC
39Y8954	DPI Universal Rack PDU with Israel LC
39Y8955	DPI Universal Rack PDU with Italy LC
39Y8956	DPI Universal Rack PDU with South Africa LC
39Y8957	DPI Universal Rack PDU with UK LC
39Y8958	DPI Universal Rack PDU with AS/NZ LC
39Y8959	DPI Universal Rack PDU with China LC
39Y8962	DPI Universal Rack PDU (Argentina)
39Y8960	DPI Universal Rack PDU (Brazil)
39Y8961	DPI Universal Rack PDU (India)
0U Basic PDUs	
46M4122	IBM 0U 24 C13 16A 3 Phase PDU
46M4125	IBM 0U 24 C13 30A 3 Phase PDU
46M4128	IBM 0U 24 C13 30A PDU
46M4131	IBM 0U 24 C13 32A PDU
46M4140	IBM 0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	IBM 0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the *IBM 1U Switched and Monitored Power Distribution Units* at-a-glance guide at: http://www.redbooks.ibm.com/abstracts/tips0775.html?Open

Rack cabinets

The server supports the rack cabinets listed in the following table.

Table 25. Rack cabinets

Part number	Description
201886X	IBM 11U Office Enablement Kit
93072PX	IBM 25U Static S2 Standard Rack
93072RX	IBM 25U Standard Rack
93074RX	IBM 42U Standard Rack
93074XX	IBM 42U Standard Rack Extension
93084EX	IBM 42U Enterprise Expansion Rack
93084PX	IBM 42U Enterprise Rack
93604EX	IBM 42U 1200 mm Deep Dynamic Expansion Rack
93604PX	IBM 42U 1200 mm Deep Dynamic Rack
93614EX	IBM 42U 1200 mm Deep Static Expansion Rack
93614PX	IBM 42U 1200 mm Deep Static Rack
93624EX	IBM 47U 1200 mm Deep Static Expansion Rack
93624PX	IBM 47U 1200 mm Deep Static Rack
99564RX	IBM S2 42U Dynamic Standard Rack
99564XX	IBM S2 42U Dynamic Standard Expansion Rack

Rack options

The server supports the rack console switches and monitor kits listed in the following table.

Table 26. Rack options

Part number	Description
Monitor kits and keyboard trays	
172317X	1U 17in Flat Panel Console Kit
172319X	1U 19in Flat Panel Console Kit
Console switches	
1754D2X	IBM Global 4x2x32 Console Manager (GCM32)
1754D1X	IBM Global 2x2x16 Console Manager (GCM16)
1754A2X	IBM Local 2x16 Console Manager (LCM16)
1754A1X	IBM Local 1x8 Console Manager (LCM8)
Console cables	
43V6147	IBM Single Cable USB Conversion Option (UCO)
39M2895	IBM USB Conversion Option (4 Pack UCO)
39M2897	IBM Long KVM Conversion Option (4 Pack Long KCO)
46M5383	IBM Virtual Media Conversion Option Gen2 (VCO2)
46M5382	IBM Serial Conversion Option (SCO)

For more information, see the following IBM Redbooks® at-a-glance guides:

- *IBM 1754 LCM8 and LCM16 Local Console Managers* at-a-glance guide
  http://www.redbooks.ibm.com/abstracts/tips0788.html?Open
- *IBM GCM16 and GCM32 Global Console Managers* at-a-glance guide
  http://www.redbooks.ibm.com/abstracts/tips0772.html?Open
- *IBM 1U 17-inch and 19-inch Flat Panel Console Kits* at-a-glance guide
  http://www.redbooks.ibm.com/abstracts/tips0731.html?Open

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Related publications and links

For more information, see these resources:

- IBM System x3650 M4 product page
  http://www.ibm.com/systems/x/hardware/rack/x3650m4/index.html
- *IBM System x 3650 M4 Installation and User's Guide*
  http://ibm.com/support
- *IBM System x 3650 M4 Problem Determination and Service Guide*
  http://ibm.com/support/
- ServerProven hardware compatibility page for the x3650 M4
  http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/xseries/7915.html
- IBM Redbooks Product Guides for IBM System x servers and options
  http://www.redbooks.ibm.com/portals/systemx?Open&page=pgbycat
- IBM System x DDR3 Memory Configurator
  http://www.ibm.com/systems/x/hardware/ddr3config/
- *Configuration and Option Guide*
  http://www.ibm.com/systems/xbc/cog/
- xREF - IBM System x Reference Sheets
  http://www.redbooks.ibm.com/xref
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